

Identifying the Cause of High Concentrations of TBA in Ground Water at Gasoline Spill Sites in Orange County, California

John T. Wilson U.S. EPA/ORD/NRMRL/GWERD/SRB

The Problem: Monitoring at gasoline spills in Orange County, California has revealed that *tertiary-butyl alcohol* (TBA)) is often present at high concentrations in ground water. To manage the hazard associated with the presence of TBA, staff of the UST Local Oversight Program (LOP) of the Orange County Health Care Agency needed to know the source of the TBA.

The Approach: There are several plausible sources of the TBA in ground water. TBA has been used as an oxygenate in gasoline in some parts of the US, it is a component of technical MTBE used in gasoline, and it can be produced by biological degradation of MTBE to TBA. When microorganisms degrade MTBE to TBA, they prefer molecules of MTBE containing the stable isotope ^{12}C and discriminate against molecules containing the stable isotope ^{13}C . The extent of biodegradation of MTBE can be determined from the shift in the ratio of ^{13}C to ^{12}C in the residual MTBE.

The Results: U.S. EPA studied a total of 13 sites in detail. At 10 of the sites natural anaerobic biodegradation of MTBE was clearly the most plausible explanation for the high concentrations of TBA in ground water. Considered in light of earlier EPA research, these results suggest that the very high levels of TBA measured in ground water at gasoline sites in Orange County are caused by the biological conversion of MTBE to TBA, and the subsequent accumulation of TBA.

